

(Claim with amendments made Feb. 06, 2003 – clean copy)

What is claimed is:

1. An apparatus having a vertically or horizontally extended furnace for forming mineral fibers of a diameter between 7-100 microns wherein the apparatus comprises:
 - (a) A vertically oriented furnace having a first side, and a second side opposite the first side, wherein said furnace can be modified to oriented horizontally having one side, and wherein horizontally oriented furnace having one melting chamber comprises horizontally extended zones with different depths to provide one direction glass body passage way turbulence flow;
 - (b) first and second melting chambers, wherein the chambers are at the top of the furnace, wherein the first chamber is positioned at the first side and the second chamber is positioned at the second side, wherein said first and second chambers of vertically oriented furnace are mounted stationary or can be modified to rotating retorts to provide efficient melting of basalt rocks containing high-gravity, high viscosity components , and wherein said one side chamber of horizontally oriented furnace is mounted stationary above zones of glass body passage way flow level;
 - (c) a first adjustable sloped valley member under the first melting chamber, and a second adjustable sloped valley member under the second melting chamber of said of vertically oriented furnace comprises zones with different depths to provide efficient mixing of melted basalt rocks;
 - (d) a vertical stack of horizontal valley members of vertically oriented furnace , wherein each horizontal valley member has an opening to permit molten material to

cascade down the stack, and wherein the valley members have various heights to promote efficient mixing and degassing;

(e) a glass collector member for receiving the molten material from the stack and homogenization basalt rock glass body;

(f) two horizontally forehearts for receiving the molten material from the collector member having additional heating elements to deliver homogeneous glass body at proper temperature to the bushings;

(g) a raised throat which retains higher-density glass component in the collector member and permits the passage of suitable density glass body to forehearts and to the bushings;

(k) two-chamber ceramic bushings associated with in each of the forehearts, wherein each bushing comprises plurality ceramic plates with orifices,

wherein each bushing comprises two chambers: upper - fore and lower chamber, wherein upper -fore chamber of said bushing is associated with inlet tube attached to the collector and the lower chamber is associated with withdraw orificed plates, wherein fore-chamber of a ceramic bushing permits additional glass body heat-treatment right before withdraw from lower chamber to form plurality of fiber, and wherein each bushing further comprises water-cooled fins comprising TiNi intermetallic walls, wherein the TiNi a water vapor permeable; and

(h) each said members of multifunctional apparatus operation is designed to manufacture amorphous fibers with ductile properties utilizing natural basalt rocks having a variety properties - different chemical composition and petrology characteristics.

(Claim 1 before my amendments)

What is claimed is:

1. An apparatus for forming mineral fibers of a diameter between 7-100 microns wherein the apparatus comprises:
 - (a) a vertically oriented furnace having a first side, and a second side opposite the first side;
 - (b) first and second melting chambers, wherein the chambers are at the top of the furnace and wherein the first chamber is positioned at the first side and the second chamber is positioned at the second side;
 - (c) a first adjustable sloped valley member under the first melting chamber, and a second adjustable sloped valley member under the second melting chamber;
 - (d) a vertical stack of horizontal valley members, wherein each horizontal valley member has an opening to permit molten material to cascade down the stack;
 - (e) a glass collector member for receiving the molten material from the stack;
 - (f) two forehearts for receiving the molten material from the collector member;
 - (g) a raised throat which retains higher-density glass component in the collector member and permits the passage of lower-density glass components; and
 - (k) two-chamber ceramic bushings in each of the fore hearths, wherein each bushing comprises at least two ceramic plates with orifices; wherein the valley members have various heights to promote mixing and degassing and wherein each bushing further comprises water-cooled fins comprising TiNi intermetallic walls, wherein the TiNi a water vapor permeable.

(Claim with amendments made Feb. 06, 2003)

What is claimed is:

1. An apparatus having a vertically or horizontally extended furnace for forming mineral fibers of a diameter between 7-100 microns wherein the apparatus comprises:
 - (a) A vertically oriented furnace having a first side, and a second side opposite the first side, wherein said furnace can be modified to oriented horizontally having one side, and wherein horizontally oriented furnace having one melting chamber comprises horizontally extended zones with different depths to provide one direction glass body passage way turbulence flow;
 - (b) first and second melting chambers, wherein the chambers are at the top of the furnace, wherein the first chamber is positioned at the first side and the second chamber is positioned at the second side, wherein said first and second chambers of vertically oriented furnace are mounted stationary or can be modified to rotating retorts to provide efficient melting of basalt rocks containing high-gravity, high viscosity components , and wherein said one side chamber of horizontally oriented furnace is mounted stationary above zones of glass body passage way flow level;
 - (c) a first adjustable sloped valley member under the first melting chamber, and a second adjustable sloped valley member under the second melting chamber of said of vertically oriented furnace comprises zones with different depths to provide efficient mixing of melted basalt rocks;
 - (d) a vertical stack of horizontal valley members of vertically oriented furnace , wherein each horizontal valley member has an opening to permit molten material to

cascade down the stack, and wherein the valley members have various heights to promote efficient mixing and degassing;

- (e) a glass collector member for receiving the molten material from the stack and homogenization basalt rock glass body;
- (f) two horizontally forehearts for receiving the molten material from the collector member having additional heating elements to deliver homogeneous glass body at proper temperature to the bushings;
- (g) a raised throat which retains higher-density glass component in the collector member and permits the passage of suitable lower-density glass body to forehearts and to the bushings components;
- (k) two-chamber ceramic bushings associated with in each of the forehearts, wherein each bushing comprises plurality ~~at least two~~ ceramic plates with orifices,
~~wherein the valley members have various heights to promote mixing and degassing ,~~
wherein each bushing comprises two chambers: upper - fore and lower chamber, wherein upper -fore chamber of said bushing is associated with inlet tube attached to the collector and the lower chamber is associated with withdraw orificed plates, wherein fore-chamber of a ceramic bushing permits additional glass body heat-treatment right before withdraw from lower chamber to form plurality of fiber, and wherein each bushing further comprises water-cooled fins comprising TiNi intermetallic walls, wherein the TiNi a water vapor permeable; and
- (h) each said members of multifunctional apparatus operation is designed to manufacture amorphous fibers with ductile properties utilizing natural basalt rocks having a variety properties - different chemical composition and petrology characteristics.

(Claim with amendments made Feb. 06, 2003 – clean copy)

What is claimed is:

1. An apparatus having a vertically or horizontally extended furnace for forming mineral fibers of a diameter between 7-100 microns wherein the apparatus comprises:
 - (a) A vertically oriented furnace having a first side, and a second side opposite the first side, wherein said furnace can be modified to oriented horizontally having one side, and wherein horizontally oriented furnace having one melting chamber comprises horizontally extended zones with different depths to provide one direction glass body passage way turbulence flow;
 - (b) first and second melting chambers, wherein the chambers are at the top of the furnace, wherein the first chamber is positioned at the first side and the second chamber is positioned at the second side, wherein said first and second chambers of vertically oriented furnace are mounted stationary or can be modified to rotating retorts to provide efficient melting of basalt rocks containing high-gravity, high viscosity components , and wherein said one side chamber of horizontally oriented furnace is mounted stationary above zones of glass body passage way flow level;
 - (c) a first adjustable sloped valley member under the first melting chamber, and a second adjustable sloped valley member under the second melting chamber of said of vertically oriented furnace comprises zones with different depths to provide efficient mixing of melted basalt rocks;
 - (d) a vertical stack of horizontal valley members of vertically oriented furnace , wherein each horizontal valley member has an opening to permit molten material to

cascade down the stack, and wherein the valley members have various heights to promote efficient mixing and degassing;

(e) a glass collector member for receiving the molten material from the stack and homogenization basalt rock glass body;

(f) two horizontally forehearts for receiving the molten material from the collector member having additional heating elements to deliver homogeneous glass body at proper temperature to the bushings;

(g) a raised throat which retains higher-density glass component in the collector member and permits the passage of suitable density glass body to forehearts and to the bushings;

(k) two-chamber ceramic bushings associated with in each of the forehearts, wherein each bushing comprises plurality ceramic plates with orifices, wherein each bushing comprises two chambers: upper – fore and lower chamber, wherein upper -fore chamber of said bushing is associated with inlet tube attached to the collector and the lower chamber is associated with withdraw orificed plates, wherein fore-chamber of a ceramic bushing permits additional glass body heat-treatment right before withdraw from lower chamber to form plurality of fiber, and wherein each bushing further comprises water-cooled fins comprising TiNi intermetallic walls, wherein the TiNi a water vapor permeable; and

(h) each said members of multifunctional apparatus operation is designed to manufacture amorphous fibers with ductile properties utilizing natural basalt rocks having a variety properties - different chemical composition and petrology characteristics.

(Claim 1 before my amendments)

What is claimed is:

1. An apparatus for forming mineral fibers of a diameter between 7-100 microns wherein the apparatus comprises:
 - (a) a vertically oriented furnace having a first side, and a second side opposite the first side;
 - (b) first and second melting chambers, wherein the chambers are at the top of the furnace and wherein the first chamber is positioned at the first side and the second chamber is positioned at the second side;
 - (c) a first adjustable sloped valley member under the first melting chamber, and a second adjustable sloped valley member under the second melting chamber;
 - (d) a vertical stack of horizontal valley members, wherein each horizontal valley member has an opening to permit molten material to cascade down the stack;
 - (e) a glass collector member for receiving the molten material from the stack;
 - (f) two forehearts for receiving the molten material from the collector member;
 - (g) a raised throat which retains higher-density glass component in the collector member and permits the passage of lower-density glass components; and
 - (k) two-chamber ceramic bushings in each of the fore hearths, wherein each bushing comprises at least two ceramic plates with orifices; wherein the valley members have various heights to promote mixing and degassing and wherein each bushing further comprises water-cooled fins comprising TiNi intermetallic walls, wherein the TiNi is a water vapor permeable.